

CLAIMS

- 1 1. A golf club comprising:
2 a 6DOF inertial measurement unit disposed within the head of the golf club; and
3 a microprocessor in communication with the 6DOF inertial measurement unit, the
4 microprocessor configured to receive data from the 6DOF inertial measurement unit and
5 determine the translational and rotational motion of the head of the golf club.
- 1 2. The golf club of claim 1, wherein the head of the golf club comprises a putter
2 head.
- 1 3. The golf club of claim 1, wherein the head of the golf club comprises one of an
2 iron and a wood.
- 1 4. The golf club of claim 1, wherein the microprocessor is configured to determine
2 the motion of the head of the golf club using a Quaternion algorithm.
- 1 5. The golf club of claim 1, wherein the microprocessor is configured to determine
2 the motion of the head of the gold club using an Euler angle algorithm.
- 1 6. The golf club of claim 1, further comprising:
2 a kinematic reference model stored in memory;
3 wherein the microprocessor is further configured to compare the motion of the
4 head of the golf club to the kinematic reference model.

1 7. The golf club of claim 1, wherein the golf club comprises a putter and the
2 microprocessor is further configured to determine whether the head of the putter rotates
3 beyond a certain threshold during a putting stroke.

1 8. The golf club of claim 1, wherein the golf club comprises a putter and the
2 microprocessor is further configured to determine whether, during a putting stroke, the
3 head of the putter deviates from the target line by a predetermined threshold.

1 9. The golf club of claim 6, wherein the golf club comprises a putter and the
2 microprocessor is further configured to:
3 determine the acceleration of the head of the putter through impact of the ball; and
4 provide feedback based on the determined acceleration.

1 10. The golf club of claim 1, further comprising a feedback mechanism in
2 communication with the microprocessor, the feedback mechanism configured to provide
3 information to a user of the golf club based on the comparison of the motion of the head
4 of the golf club and the kinematic reference model.

1 11. The golf club of claim 10, wherein the feedback mechanism comprises a display.

1 12. The golf club of claim 10, wherein the feedback mechanism employs an audio
2 cue.

1 13. The golf club of claim 1, further comprising a distance/elevation calculation
2 functionality comprising logic configured to determine the distance/elevation between a
3 first position and a second position based on the movement of the head of the golf club
4 from the first point to the second point.

1 14. The golf club of claim 13, wherein the golf club is a putter and further comprising:
2 logic configured to determine, based on the movement of the head of the putter
3 during a putting stroke, at least one of the following distances: the drawback distance of
4 the head of the putter and the follow-through distance of the head of the putter; and
5 logic configured to compare at least one of the drawback distance and the follow-
6 through distance to the travel distance of the ball struck by the head of the putter.

1 15. The golf club of claim 1, wherein the golf club comprises a putter and further
2 comprising a Stimpmeter functionality comprising logic configured to calculate the
3 “speed” of a green based on the impact velocity of the putter head and the resulting
4 distance the golf ball travels on the green.

1 16. The golf club of claim 15, wherein the microprocessor is further configured to
2 calculate an amount of “break” to be applied by a golfer based on an orientation of the
3 face of the putter at address relative to a ball-to-hole line.

1 17. The golf club of claim 1, wherein the microprocessor is further configured to
2 determine the motion of the head of the golf club by performing a gravity cancellation
3 algorithm.

1 18. The golf club of claim 1, further comprising a mode switching mechanism
2 adapted to enable a user to select between a training mode in which the 6DOF inertial
3 measurement unit and the microprocessor are engaged and a competition mode in which
4 the 6DOF inertial management unit and the microprocessor are disengaged.

1 19. The golf club of claim 18, wherein the mode selection device comprises a switch.

1 20. The golf club of claim 1, wherein the 6DOF inertial measurement unit and the
2 microprocessor are rigidly fixed within the head of the golf club.

1 21. The golf club of claim 1, wherein the physical properties of the 6DOF inertial
2 measurement unit, the microprocessor, and the head of the golf club comply with rules of
3 golf promulgated by the United States Golf Association and The Royal and Ancient Golf
4 Club of St. Andrews.

1 22. The golf club of claim 1, wherein the microprocessor is further configured to
2 initialize an inertial reference frame using a gravity vector.